DET PSYKOLOGISKE FAKULTET

A Population-Based Study on Health Anxiety and Disability Pension Award: The HUSK Study

HOVEDOPPGAVE

profesjonsstudiet i psykologi

Ove Heradstveit & Kari Eriksen

Vår 2008

Veileder
Arnstein Mykletun

Foreword

This work is part of a larger project linking national epidemiological cohort studies and a comprehensive national database. The paper is formatted to be submitted to 'Psychosomatic Medicine'. Due to the complexity and novelty of the topic, the current manuscript slightly exceeds the suggested standard volume for publication. We will however be willing to shorten the manuscript if suggested in the review process. We would like to thank Professor John Gunnar Mæland and HUSK research centre for providing data, and Professor Ingvard Wilhelmsen for careful advises and clinical insight. We particularly appreciate the involvement and contribution of our main supervisor PhD Arnstein Mykletun. His enthusiasm, inspiration and professional advices have been invaluable. The study has provided us with new knowledge of the field as well as a greater understanding of the scientific method.

A Population-Based Study on Health Anxiety and Disability Pension Award: The HUSK Study

OVE HERADSTVEIT AND KARI ERIKSEN

From the Faculty of Psychology, Research center for Health Promotion, University of Bergen, Norway (O.H., K.E.)

Address correspondence and reprint requests to Ove Heradstveit, University of Bergen, Christiesgt 13, N-5015 Bergen, Norway. E-mail: Ove.Heradstveit@student.uib.no

ABSTRACT

Objective: Studies exploring functional impairments in health anxiety are almost exclusively cross-sectional, and mainly carried out in clinical settings. As most cases never find their way into psychiatric treatment, our knowledge on the long-term prognosis of health anxiety as it occurs in the general population is limited. We aimed to study the long term prognosis of health anxiety by employing subsequent disability pension award as a measure of global functioning. **Methods:** Using a historical cohort design, we utilized a unique link between a large epidemiological cohort study and a comprehensive national database. Information on disability benefit recipiency was obtained from Norwegian registry data, and merged with health information, including health anxiety and a range of potential confounders, from the Hordaland Health Study (HUSK) in Western Norway, 1997–99. Participants (N = 6819) were aged 40-46 at baseline, and the mean time of follow-up after participation was 3.6 years. **Results:** Health anxiety was a strong independent risk factor for subsequent disability pension award. This effect was only partly accounted for by adjusting for gender, socio-demographic variables, somatic conditions, anxiety, depression and somatic symptoms. The increased risk of health anxiety on disability pension award was not only observed at the highest symptom levels. There was also a significant dose-response association. **Conclusions:** Health anxiety is associated with subsequent long-term work-related disability. The true effect of health anxiety on disability pension award appears to be underestimated in official registries.

Keywords

Health anxiety, hypochondriasis, prognosis, work-related disability, disability pension

INTRODUCTION

Hypochondriasis is classified as a somatoform disorder in which there is an excessive concern for one's own health. This is coupled with the belief that one has an undiagnosed physical illness, which persists despite adequate reassurance from medical staff (1). A range of disabling consequences is found to by associated with hypochondriasis (2), among them impaired physical health (3), more health worries, psychiatric symptoms (4) and medically unexplained symptoms (3), an above average utilization of health service (5) higher health care costs (6), and occupational disability (5). However, the studies demonstrating this are almost exclusively cross-sectional, making casual assumptions more difficult.

Generally, the findings in primary care settings indicate that the full syndrome of hypochondriasis according to diagnostic criteria is relatively uncommon, however, prevalence rates are conflictual, ranging from 0.2 to 8.5% (2, 7). It has been argued that the present ICD-10 and DSM-IV definitions of hypochondriasis are highly restrictive (5, 7). As a consequence, attempts have been made to define and validate an abridged form of hypochondriasis (5, 7). In addition to concepts of abridged hypochondriasis, the term ‘health anxiety’ was conceptualized on a continuum ranging from mild to severe (8) with hypochondriasis being at the severe end of the continuum (9). Such less restrictive conceptualizations of hypochondriasis are relatively prevalent, with estimates ranging from 2 to 9% (3, 5), and are related to considerable psychological and physical impairment (10). A large community-based study even indicate that patients with the full syndrome of hypochondriasis were no more disabled than those with less extreme health anxiety symptoms (5). This suggests that health anxiety below the diagnostic threshold of hypochondriasis should be included into clinical and scientific consideration.

Comorbidity with other psychiatric disorders is common in hypochondriasis: 62% (11) to 88% (12) in this patient group presents with at least one additional psychiatric disorder.

The differentiation and association between commonly comorbid mental disorders are generally debated. Somatization disorder (e.g. 13) and other anxiety disorders (e.g. 14) are the most commonly reported comorbid conditions to hypochondriasis. The boundaries between the disorders have consequently been subject to scientific discussion (15, 16). However, the question persists whether hypochondriasis represent a distinct nosological category. No studies have to our knowledge examined the extent to which health anxiety is related to disability when controlling for comorbid conditions.

Several theoretical and empirical attempts have been made to distinguish different conceptual dimension of hypochondriasis (e.g. 17). A particularly common approach is the three components proposed by Pilowsky (18): 'disease phobia', 'disease conviction', and 'bodily preoccupation'. Research has mainly focused on validating the factors by exploring internal validity and external validity in terms of case-finding properties (e.g. 19). To our knowledge no studies have examined how the different conceptual dimensions are related to functional impairment.

Disability benefit awards are likely to be a valid measure of functional impairment related to mental disorders, as loss of ability to work is among the functional disabilities generally associated with psychopathology (20).

In the present study we aim to study the effect of health anxiety on subsequent disability pension awards in the context of a population-based health survey. More specifically we aim to study the following questions:

- Is there an independent effect of health anxiety on subsequent disability pension award?
- Is the eventual effect of health anxiety on subsequent disability pension award exclusive to the very highest symptom levels?

- Is health anxiety officially recognized as cause of disability pension award in official statistics and clinical practice?
- How strong is the effect size of health anxiety on subsequent disability pension award compared to other mental disorders?
- Are the three components of health anxiety; ‘bodily preoccupation’, ‘disease phobia’ and ‘disease conviction’, all related to subsequent disability pension award?

METHODS

Study Design

This historical cohort study used mental and somatic health data obtained from the Hordaland Health Study (HUSK). HUSK was a joint epidemiological research project carried out from 1997 to 1999 by the National (Norwegian) Health Screening Service in collaboration with the University of Bergen. Disability pension award over a 6.6 years follow-up period after baseline assessment were obtained from the National Insurance Administration and were linked to the HUSK Study data using the national identity number. The study design is inspired by previous publications linking national epidemiological cohort studies to data from the National Insurance Administration (21-23).

Participants and Procedures

The base population included 29 400 individuals in Hordaland County in western Norway born 1953 to 1957, aged 40 to 47 at the time of the data collection. Data were collected by questionnaires and clinical examinations. A total of 18 581 (8 598 men and 9983 women) answered both the first questionnaire and attended the clinical examinations, yielding a participation rate of 63% (57% for men and 70% for women). Upon attending the clinical examinations, a second questionnaire including the Whiteley Index was distributed to a random 50% of the participants and prompted for return by mail. A total of 7274 individuals (3779 men and 3495 women) returned this. HUSK responders who were receiving a disability pension award at baseline or who were granted a disability pension award within 12 months after baseline were excluded (N=277). Valid responses to Whiteley Index, HADS general anxiety, HADS depression and somatic symptoms questionnaires were set as inclusion criteria for our study population. All individuals lacking information on either of these variables were excluded (N=178). Individuals lacking information on number of somatic diagnosis (N=13),

number of drugs taken for any somatic condition (N=111) and household income (N=221) were given the mean values of the total population on the respective variables (missing substitution). After exclusion, the study population consisted of 6819 persons (3569 men and 3250 women), yielding a final response rate of 46%.

Exposure: Health Anxiety

Health anxiety was assessed with the 14-item self-report questionnaire Whiteley Index (18), which is one of the most widely used hypochondriasis screening instruments (24). Whiteley Index is designed to assess core features of health anxiety. Its validity, reliability, and sensitivity to change have been well demonstrated (e.g. 25). Each of the 14 items describes symptoms of health anxiety, and participants were asked to rate how true these descriptions were for them on a 5 point likert scale labelled; 'Not at all, to some extent, moderately, to a considerable extent, to a great extent'.

In our study the Whiteley Index is used both as a continuous variable with higher scores reflecting increasing symptom load, and as a categorical variable based on a 95th percentile cut-off. Scores above cut-off are further referred to as 'case-level'. The cut-off is arbitrary chosen and is not intended to be a proxy for a DSM-IV or ICD-10 defined hypochondriasis diagnosis. However, it is likely that the continuum of health anxiety overlap with the diagnosis of hypochondriasis in the highest percentiles (9).

The Whiteley Index has been used mainly as a full scale (e.g. 26) in clinically based research, but in the original version it includes three different subscales (18): 'disease phobia', 'bodily preoccupation', 'disease conviction'. We both use the full scale as exposure measure, and do also include some additional analyses of the subscales.

Outcome: Disability Pension Awards

The outcome variable was award of a disability pension 1.0 – 6.6 years after participation in HUSK. By excluding all disability pensions awarded 0 – 12 months after participation in the health survey, we aimed to exclude subjects in the process of applying for a disability pension award while they attended HUSK, thus reducing any possible protopathic bias (22). The mean time of follow-up for those receiving a disability pension award was 3.6 years after the health survey (S.D. = 1.5 years).

Information on benefits was confirmed from the National Insurance Administration and was merged to the health survey by Statistics Norway through the national identification number. The National Insurance Administration records all grants of disability pension award, which, in Norway, is a public responsibility. Correct registration is a prerequisite for transfers of payments; thus, the records are highly accurate.

The National Insurance Administration records one or two diagnoses, primary and secondary diagnosis warranting disability pension award for every application. Diagnoses were encoded according to ICD-10. We use the primary diagnose for every application in our analyses. Diagnoses were used to identify disability pension awarded for any mental disorder (F00 – F99), for any anxiety disorder diagnoses (F40 – F48), and for any musculoskeletal diagnoses (M00 – M99).

Mediators and Confounders

General anxiety and depression symptoms were assessed with the Hospital Anxiety and Depression Scale (HADS), which contain seven items each on cognitive symptoms of general anxiety and depression (27). In a recent literature review, HADS has demonstrated good case-finding properties for anxiety and depression in both primary care and hospital settings (28). In our study HADS-scores are used as continuous variables, with increasing levels reflecting higher *anxiety* and *depression* symptom load.

Questions on somatic diagnoses were framed in the form of: 'Do you have or have you had (one of the following)', coronary infarction, stroke, diabetes, asthma, multiple sclerosis, chronic bronchitis, osteoporosis, or fibromyalgia. Numbers of positive responses to these items produces a continuous variable of self-reported diagnoses (*somatic diagnoses*). In addition, participants were asked if they used any medication the previous day, and if so, for which condition. From these responses, a team of physicians appointed appropriate ICPC-diagnoses according to ATC-classifications, producing a continuous variable indicating number of somatic conditions for which the person is taking medication (*drugs taken for any somatic condition*).

Participants were also asked to rate the frequency of 17 common symptoms from different organ systems in accordance with the ICD-10 Research Criteria for F45 Somatoform Disorders (29) on a five point likert scale labelled: 'Almost never, rarely, sometimes, often and almost always'. The items were summed and comprise the continuous variable *somatic symptoms*. This variable is an indicator both of somatic health with increasing levels reflecting higher symptom load, and mental health with higher scores reflecting an increased tendency towards somatization. After adjustment for somatic conditions, we are interpreting higher scores of this variable as *somatization*. Total symptom scores are often used in both research and clinical practice to determine severity levels, especially for mental health conditions. Higher scores reflect more health problems.

Information on *gender* and *age* at the time of the HUSK study was obtained from the national population registry. Self-reported annual household *income* was measured by one item and coded in nine categories from no income to more than NOK 500 000 (approximately € 60 000). Level of *education* was reported in four categories from less than seven years of schooling up to 4 years or more of higher education in college/university.

Statistics

To explore whether there was an independent effect of health anxiety on subsequent disability pension award we used a logistic regression analysis. In this paper, results are presented as odds ratios with 95 percent confidence intervals. Blocks of variables were entered sequentially in an a priori determined order, and finally in a fully adjusted model. Gender, income and education were entered first. Thereafter somatic conditions (somatic diagnoses and drugs taken for any somatic condition) were entered, as it was presumed to be an important cause of disability benefits, and to avoid overestimating subsequent effects of anxiety, depression and somatic symptoms. Anxiety and depression were entered separately because we were interested in their unique contribution as confounding factors. The somatic symptoms variable was entered last as it might be a product of either somatic conditions or anxiety and depression. This procedure was done with both continuous and categorical health-anxiety variables. We also made a combination variable of health anxiety and somatization, to examine the unique and combined contribution of somatization. The variable included four levels: neither health anxiety nor somatization, somatization only, health anxiety only, and comorbid somatization and health anxiety; all based on a 90^{th} percentile cut-off. This variable was further used as a predictor variable in the same hierarchal model.

To explore whether the effect of health anxiety on subsequent disability pension award was exclusive to the very highest symptom levels, as opposed to being a dose-response association applying to the whole scale, we coded the continuous health anxiety variable into deciles. This was plotted against percentage awarded disability pension award during follow up. Results are presented with 95% confidence interval. Pearson correlation coefficient was used to test the linearity of the relationship.

To determine to what extent health anxiety was officially recognized as cause of disability pension award in official statistics and clinical practice, the logistic regression

model described above was carried out equivalently for three nested outcomes; the subsequent award of 1) any disability pension, 2) disability pension excluding those justified by an anxiety disorder and 3) disability pension excluding those justified by any mental disorder. We also checked whether any of the individuals participating in the study was awarded a disability pension for the specific cause of hypochondriasis in official statistics. In addition, the Pearson chi-square test was used to compare the causes of permanent work disability in case-level and non case-level health anxiety.

To determine the relative strength of the effect of health anxiety on subsequent disability pension award compared to other mental disorders, we did separate logistic regression analyses with the HADS general anxiety and depression variables as predictor variables (continuous scores).

To explore whether the three components of health anxiety; 'bodily preoccupation', 'disease phobia' and 'disease conviction', all were related to subsequent disability pension award, exploratory principal component analysis was conducted on the items of the Whiteley Index, using the Kaiser criterion to determine the number of factors, where only factors whose eigenvalues are larger than 1 are considered as being of interest. Logistic regression analysis was used to examine the relation between each of the factors of interest and the outcome of subsequent disability pension award.

Ethics

The study protocol was approved by the Regional Committee for Medical Research Ethics, Western Norway and by the Norwegian Data Inspectorate.

RESULTS

The baseline characteristics of the 6819 persons who completed the Whiteley Index questionnaire are shown in table 1. Health anxiety was equally prevalent among men and women. It was more prevalent among persons with lower educational levels and lower household income. Self-reported somatic symptoms, anxiety and depression were all strongly associated with health anxiety, whereas number of somatic diagnoses was not.

Health anxiety was associated with a significantly elevated risk (OR 1.76, 95% CI: 1.60 – 1.94) for subsequent disability pension award during follow up (table 2, left column). Similar results were found for the cut-off based scores (table 3, left column). This effect was only slightly attenuated after adjustment for gender, education and income, and somatic conditions. Further adjustment for HADS general anxiety and depression reduced the effect moderately. Adjusting for somatic symptoms explained a substantial part of the effect, although the effect of health anxiety remained highly significant. There was an increased risk of disability pension award in comorbid cases of health anxiety and somatization (table 4). However, there was no interaction effect between the two disorders on award of disability pension, so the higher risk in the comorbid group was merely an additive effect.

There was a dose-response association ($r=.114$, $p<.001$) between levels of health anxiety and subsequent award of disability pension during follow-up (figure 1). The association was stronger in the two last than in the eight first deciles. However, the dose-response association was still highly significant ($r=.046$, $p\leq.001$) within the eight first deciles.

Several findings indicate an underestimation of the effect of health anxiety in official statistics and clinical practice. First, the effect of health anxiety on subsequent disability pension award, when excluding those justified by any anxiety disorder diagnostic code, as well as by any mental disorder diagnostic code, was as strong as for the award of disability pension in general (table 2 and 3, right column). Second, even if there was a tendency that

more disability pensions were awarded for mental disorders in case-levels, there was no significant difference in official causes of disability pension award between case-level health anxiety and non case-levels (table 5). Last, no disability pensions were awarded for the specific cause of hypochondriasis.

The effect of health anxiety on the outcome of subsequent disability pension award was on level with that of both HADS depression (OR 1.58, 95% CI: 1.42 – 1.76) and HADS general anxiety (OR 1.55, 95% CI: 1.38 – 1.74) (table 6).

Factor analysis of the Whiteley Index revealed three factors similar to the original scales proposed by Pilowsky (18) (Table 7). The subscales of ‘bodily preoccupation’ and ‘disease conviction’ were significant predictors of subsequent disability pension award, whereas the subscale ‘disease phobia’ was not.

DISCUSSION

Summary of Results

In summary, we found that health anxiety was a strong predictor of subsequent disability pension award. The increased risk of health anxiety on disability pension award was not only observed at the highest symptom levels; there was also a significant dose-response association. Health anxiety appears to be under-recognized as cause of disability pension award in official statistics and clinical practice. The effect of health anxiety on subsequent disability pension awards was on level with that of depression and general anxiety. As depression is the most important mental diagnosis causing disability pension award (30), this clearly demonstrates the importance of our findings.

Population-based studies on health anxiety and hypochondriasis are specifically called for in recent scientific work (2). Our study is the first using a prospective population-based design to show long-time adverse effects of health anxiety on work-related disability.

Strength and Limitations

The present study has several strengths mainly arising from the cohort design. The study sample was large, and the participation rate at baseline was high. Both exposure and outcome assessments should be relatively unbiased. At baseline measurement, neither participants nor administrators were aware of the specific research hypotheses, reducing the possibility of information being biased by selective symptom presentation in order to gain access to, or avoid, benefits. Ascertainment of disability pension award status at baseline and at follow-up was obtained from the National Insurance Administration. These data are complete (including those moving to other parts of the country and those claiming disability benefits living abroad) and should not have been influenced by exposure status. The study covers somatic conditions, mental health and somatic symptoms that encompass the most

prevalent diseases and illnesses in benefit recipiency, as well as socio-economic variables relevant for both health and benefit recipiency (31). The included age span is highly relevant as participants potentially have a number of years left as members of the work-force, and the population was drawn from the general population in a representative area with both urban and rural communities.

There are several limitations of our study. First, the response-rate was relatively low, and it is generally assumed that there are some important differences between attenders and non-attenders in epidemiologic studies. The rate of disability pension award was higher among the non-attendees in the HUSK study (21). This could cause an underestimation of the true differences between the groups. However, non-responders are usually more functionally limited, and it is commonly held that serious psychopathology increases the risk of being a non-attendee in epidemiologic studies (32). In the specific case of hypochondriasis this might however not be the case. As preoccupation with health-related issues is a core feature of the disorder, it is possible that hypochondriacs will be more willing to attend a health screening. We can not exclude systematic bias in any direction. However, the associations are very unlikely to be products of eventual biases.

Second, there are some limitations regarding our measurement of health anxiety. Data are based on self-report rather than clinical examination. Misclassification is likely to have been random resulting in an underestimation of the true association, but bias cannot be excluded. Also, our case-level analyses are based on a non-validated, and therefore arbitrary, cut-off. However, these analyses were only supportive to the main analyses which were based on continuous scores. In addition, analyses based on alternative cut-offs yielded similar results.

Third, we interpret higher scores on the somatic symptoms variable as somatization, but cannot fully exclude that the reported symptoms are symptoms of undiscovered somatic

illnesses. However, our study population is relatively young (40-47 years at the time of data collection), reducing this possibility.

Fourth, the list of symptoms and conditions is not complete. Residual confounding from chronic somatic, psychosomatic or psychiatric conditions can therefore not be excluded. More specifically, the impacts of psychoses or other serious psychiatric conditions are not captured.

Fifth, our health anxiety index is more expansive than the measure of general anxiety. It is thus possible that our health anxiety index is more sensitive to general anxiety than our measure of general anxiety itself, possibly causing an under-estimation of the true effect of general anxiety.

Sixth, information on somatic diagnoses and symptoms was self-reported, and the categories used were not exhaustive. If such diagnoses and symptoms were underreported, the effects of health anxiety may in turn have been overestimated. However, in our fully adjusted model, health anxiety was considered to predict disability pension award only if reported somatic diagnoses, somatic symptoms, anxiety, or depression did not serve as a possible explanation. Because this model assumed that health anxiety was secondary in all instances of simultaneous occurrences, it is likely that we underestimated the strength of the association of health anxiety with later disability pension award in the fully adjusted models.

Seventh, the number of diagnoses reported by general practitioners on any application for disability pension award is limited to two; one primary diagnosis and one secondary diagnosis. As we are using only the primary diagnosis in our analyses there is a possibility that we ignore mental disorders reported as secondary diagnoses. This might have led to an underestimation of the degree to which health anxiety are recognized in official registries. Further, as general practitioners are limited to report two diagnoses, they might have intended to report mental diagnoses but were hindered by the restriction to number of diagnoses. We

do however believe this to be a limited problem since previous studies on the same data material have found that mental diagnoses when used, commonly were reported as primary diagnoses (22).

Eighth, we are intending to control for potential confounders to establish whether or not there is an independent association between health anxiety and subsequent disability pension awards. Confounders are defined as variables which are causally related to the outcome, but are not on a causal pathway between exposure and outcome. Confounding occurs only where an association between a presumed causal variable and a presumed outcome is accounted for by a common cause not in the postulated causal pathway. Thus, if some of the factors we are adjusting for in our model lie on the causal pathway from health anxiety to award of disability pension, we are over-adjusting. In our model somatic symptoms and anxiety poses particular challenges as their association and differentiation to health anxiety are not yet fully understood. However, the most conservative way to deal with such an unresolved question regarding the nature of the relationship between the variables is to adjust for it.

Regarding the study's generalizability, the disability pension schemes in Norway are similar to other OECD countries, and similar secular increases in the proportion of inflow cases justified by psychiatric diagnoses have been reported (33). However, disability expenditures constitute a greater part of the gross domestic product (GDP) in Norway than in most other OECD countries (34).

Implications

Our findings have noteworthy implications on several domains, including the management of employment issues in dealing with health anxiety and mental disorders in

general, the need for a broader concept of hypochondriasis, and the boundaries between health anxiety and related disorders.

First, our findings have implications for the societal management of health anxiety. According to official registries, mental disorders account for 30% of all disability pensions awarded in Norway (35). However, studies suggest that the true impact of mental disorders in this regard is considerably underestimated (22). Several of the results in the present study, indicate that this also might be the case for health anxiety. Most important, disability pensions in cases of health anxiety were neither awarded for other ICD-10 anxiety disorder diagnoses nor for other mental disorders. Even if the assigned somatic causes are both accurate and relevant, they might not constitute the whole clinical picture.

There are several plausible explanations for mental disorders being under-estimated as causes to disability pensions. General practitioners (GP) might be hesitant to report mental diagnoses on the application for disability pension when the patient presents with diffuse somatic symptoms (21). Also, there is a possibility that the underlying psychopathology is not detected by the GPs. Further, GPs are supposed to apply diagnostic criteria strictly and not report subsyndromal conditions. This is problematic as considerable impairment results from subsyndromal cases of mental disorders (36).

The current under-estimation of mental disorders in general and health anxiety specifically as causes to disability pension award has several negative implications. As official registries guide political priorities and allocations, under-estimation might lead to political neglect in addressing the problem. Also, the overall costs of work disability are high, both to employees and employers, and to the society as a whole (37, 38). This should encourage a re-examination of the effectiveness of measures addressing the employment issues of people with mental disorders, and point to the need to take appropriate measures in the public health management of the disorder.

Until recently, no specific treatment of hypochondriasis and health anxiety was clearly demonstrated to be effective. However, several reviews conclude that both relatively brief individual cognitive-behavioral therapy (CBT) (39) and pharmacological treatments with selective serotonin reuptake inhibitors (SSRIs) (40) constitute effective treatments of hypochondriasis.

However, most likely the majority of health anxiety cases are not offered any treatment, as mental health problems are generally reported to be under-treated (41). Further, it is reason to believe that the available treatment not necessarily represent 'state-of-the-art-treatment', as the process of integrating scientifically based treatment guidelines has been proven to be difficult (42). Whether and to which degree persons entering the disability benefit system have had access to appropriate treatment is also questioned (43). Recent studies therefore suggest that there is a potential for preventing permanent work-related disability through improved access to effective treatment (44, 45). Even if there currently is no research available on under-treatment of health anxiety before awarding of disability pension, there is reason to believe that treatment is underutilized also here.

Second, the increased risk of health anxiety on subsequent disability awards was not only observed at the very highest symptom levels. There was also a significant dose-response association. This indicates a disabling impact of health anxiety even at moderately high levels. The diagnostic cut-off for hypochondriasis has been questioned in recent research (5, 10, 46, 47), pointing to a need for a broader concept of hypochondriasis than represented in the stochastic diagnostic definitions. Our findings support such notions. However, as opposed to a recent finding indicating that subsyndromal hypochondriasis is as disabling as full blown hypochondriasis (5), our results clearly indicate that the highest symptom levels is associated with most pronounced impairment.

Third, somatization and anxiety constitute particular challenges to the question of whether there is an independent effect of health anxiety on subsequent disability pension award, as the boundaries between the disorders are debated (15, 16). Our study does not represent a solution to the ongoing debates of whether health anxiety is a distinct category or overlapping with either somatization or anxiety. However, by examining the consequences of the disorders on work-related disability our study adds some knowledge to the question.

The somatizing component of health anxiety, as measured by the subscale of 'bodily preoccupation' (e.g. 24), was the strongest predictor of subsequent disability pension award. On this basis, one might suggest that the effect of health anxiety on the outcome is mainly an effect of somatization. In accordance with this interpretation, somatic symptoms per se explained a substantial part of the variance on disability pension award in all our statistical models. However, even after adjusting for somatic symptoms, the effect of health anxiety remained highly significant. Also, the subscale of 'disease conviction' was an independent risk factor for subsequent disability pension award. This factor has been suggested to represent the cognitive component of the disorder (14, 24) and is supposedly independent from the aspect of somatization. When it comes to anxiety, our findings indicate that the effect of health anxiety is not merely an effect of general anxiety. Adjusting for general anxiety does not substantially change the effect of health anxiety on the outcome. General anxiety is also not an independent risk factor for subsequent disability pension award in our models.

Thus, the disabling impact of health anxiety is clearly not fully explained by neither somatization nor general anxiety. This can be seen as a support of the conceptualization of health anxiety as a distinct disorder as opposed to both somatization and anxiety.

Conclusion

Health anxiety is associated with considerable work-related disability. Given the strong adverse consequences of work disability, this should on a policy level encourage considerations of increased involvement of mental health specialists in treatment before disability pensions are awarded. These considerations should not be limited to the full syndrome of hypochondriasis, but also apply to health anxiety below the diagnostic threshold of hypochondriasis. On the other hand, eventual initiatives to increase the accessibility and quality of treatment will have to rest upon on thorough cost-efficacy considerations.

REFERENCES

1. APA. Diagnostic and statistical manual of mental disorders. 4th ed (DSM-IV). Washington, D.C.: American Psychiatric Association; 1994.
2. Creed F, Barsky A. A systematic review of the epidemiology of somatisation disorder and hypochondriasis. Journal of Psychosomatic Research 2004;56:391-408.
3. Escobar JI, Gara M, Waitzkin H, Silver RC, Holman A, Compton W. DSM-IV hypochondriasis in primary care. General Hospital Psychiatry 1998;20:155-9.
4. Noyes R, Kathol RG, Fisher MM, Phillips BM, Suelzer MT, Holt CS. The validity of DSM-III-R hypochondriasis. Archives of General Psychiatry 1993;50:961-70.
5. Gureje O, Üstün TB, Simon GE. The syndrome of hypochondriasis: a cross-national study in primary care. Psychological Medicine 1997;27:1001-10.
6. Barsky AJ, Ettner SL, Horsky J, Bates DW. Resource utilization of patients with hypochondriacal health anxiety and somatization. Medical care 2001;39:705-15.
7. Looper KJ, Kirmayer LJ. Hypochondriacal concerns in a community population. Psychological Medicine 2001;31:577-84.
8. Barsky AJ, Wyshak G, Klerman GL. Hypochondriasis - An evaluation of the DSM-III criteria in medical outpatients. Archives of General Psychiatry 1986;43:493-500.
9. Asmundson GJG, Taylor S, Sevgur S, Cox BJ. Health anxiety: Classification and clinical features. Chichester: Wiley; 2001.
10. Bleichhardt G, Hiller W. Hypochondriasis and health anxiety in the German population. British Journal of Health Psychology 2007;12:511-23.
11. Barsky AJ, Wyshak G, Klerman GL. Psychiatric comorbidity in DSM-III-R hypochondriasis. Archives of General Psychiatry 1992;49:101-8.
12. Noyes R, Kathol RG, Fisher MM, Phillips BM, Suelzer MT, Woodman CL. One-Year Follow-up of Medical Outpatients with Hypochondriasis. Psychosomatics 1994;35:533-45.
13. Oxman TE, Barrett J. Depression and hypochondriasis in familiy-practice patients with somatization disorder. General Hospital Psychiatry 1985;7:321-9.
14. Hiller W, Leibbrand R, Rief W, Fichter MM. Differentiating hypochondriasis from panic disorder. Journal of Anxiety Disorders 2005;19:29-49.
15. Barsky AJ, Barnett MC, Cleary PD. Hypochondriasis and panic disorder - boundary and overlap. Archives of General Psychiatry 1994;51:918-25.
16. Noyes R, Stuart S, Watson DB, Langbehn DR. Distinguishing between Hypochondriasis and Somatization Disorder: A Review of the Existing Literature. Psychotherapy-and-Psychosomatics, vol. 75; 2006, p. 270-81.
17. Kellner R. Manual of the IAS (Illness Attitude Scales). Albuquerque: University of New Mexico; 1981.
18. Pilowsky I. Dimensions of Hypochondriasis British Journal of Psychiatry 1967;113:89-93.
19. Conradt M, Cavanagh M, Franklin J, Rief W. Dimensionality of the Whiteley Index: Assessment of hypochondriasis in an Australian sample of primary care patients. Journal of Psychosomatic Research 2006;60:137-43.
20. Bijl RV, Ravelli A. Current and residual functional disability associated with psychopathology: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). Psychological Medicine 2000;30:657-68.
21. Overland S, Glozier N, Maeland JG, Aaro LE, Mykletun A. Employment status and perceived health in the Hordaland Health Study (HUSK). Bmc Public Health 2006;6.

22. Mykletun A, Overland S, Dahl AA, Krokstad S, Bjerkeset O, Glozier N, Aaro LE. A population-based cohort study of the effect of common mental disorders on disability pension awards. American Journal of Psychiatry 2006;163:1412-8.
23. Sivertsen B, Overland S, Neckelmann D, Glozier N, Krokstad S, Pallesen S, Nordhus IH, Bjorvatn B, Mykletun A. The long-term effect of insomnia on work disability - The HUNT-2 historical cohort study. American Journal of Epidemiology 2006;163:1018-24.
24. Hiller W, Leibbrand R, Rief W, Fichter MM. Predictors of course and outcome in hypochondriasis after cognitive-behavioral treatment. Psychotherapy and Psychosomatics 2002;71:318-25.
25. Speckens AEM, Spinhoven P, Sloekers PPA, Bolk JH, van Hemert AM. A validation study of the whitely index, the illness attitude scales, and the somatosensory amplification scale in general medical and general practice patients. Journal of Psychosomatic Research 1996;40:95-104.
26. Greeven A, van Balkom A, Visser S, Merkelbach JW, van Rood YR, van Dyck R, van der Does AJW, Zitman FG, Spinhoven P. Cognitive behavior therapy and paroxetine in the treatment of hypochondriasis: A randomized controlled trial. American Journal of Psychiatry 2007;164:91-9.
27. Zigmond A, Snaith R. The Hospital Anxiety and Depression Scale Acta Psychiatrica Scandinavica 1983;67:361-70.
28. Bjelland I, Dahl A, Haug T, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. An updated literature review. Journal of Psychosomatic Research 2002;52:69-77.
29. WHO. The ICD-10 Classification of Mental and Behavioural Disorders:Diagnostic criteria for research. Geneva: World Health Organization; 1993.
30. Hensing G, Wahlstrom R. Chapter 7. Sickness absence and psychiatric disorders. Scandinavian Journal of Public Health 2004;32:152-80.
31. Krokstad S, Westin S. Disability in society-medical and non-medical determinants for disability pension in a Norwegian total county population study. Social Science & Medicine 2004;58:1837-48.
32. Eaton WW, Holzer CE, Vonkorff M, Anthony JC, Helzer JE, George L, Burnam MA, Boyd JH, Kessler LG, Locke BZ. The design of the Epidemiologic Catchment-Area Surveys - The control and measurment of error Archives of General Psychiatry 1984;41:942-8.
33. Prinz C. Disability programmes in need of reform. Policy Brief: OECD; 2003.
34. OECD. Sickness, Disability and Work: Breaking the Barriers. Norway, Poland and Switzerland. In Prince C editor. Paris: Organisation for Economic Corporation and Development; 2006.
35. Rikstrygdeverket. Trygdestatistisk årbok 2005. Oslo: Rikstrygdeverket; 2005.
36. Broadhead WE, Blazer DG, George LK, Chiu KT. Depression, Disability Days, and Days Lost from Work in a Prospective Epidemiologic Survey. Jama-Journal of the American Medical Association 1990;264:2524-8.
37. Kessler RC, Barber C, Birnbaum HG, Frank RG, Greenberg PE, Rose RM, Simon GE, Wang P. Depression in the workplace: Effects on short-term disability. Health Affairs 1999;18:163-71.
38. Simon GE, Revicki D, Heiligenstein J, Grothaus L, VonKorff M, Katon WJ, Hylan TR. Recovery from depression, work productivity, and health care costs among primary care patients. General Hospital Psychiatry 2000;22:153-62.

39. Kroenke K, Swindle R. Cognitive-behavioral therapy for somatization and symptom syndromes: A critical review of controlled clinical trials. Psychotherapy and Psychosomatics 2000;69:205-15.
40. Fallon BA. Pharmacotherapy of somatoform disorders. Journal of Psychosomatic Research 2004;56:455-60.
41. WHO. Prevalence, Severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. JAMA 2004;291:2581–90.
42. Thompson C, Kinmonth AL, Stevens L. Effects of a clinical-practice guideline and practicebased education on detection and outcome of depression in primary care: Hampshire Depression Project randomised controlled trial. Lancet 2000;355:185-91.
43. Layard R. Health policy - The case for psychological treatment centres. British Medical Journal 2006;332:1030-2.
44. Overland S, Glozier N, Krokstad S, Mykletun A. Undertreatment Before the Award of a Disability Pension for Mental Illness: The HUNT Study. Psychiatric Services 2007;58.
45. Isometsa ET, Katila H, Aro T. Disability pension for major depression in Finland. American Journal of Psychiatry 2000;157:1869-72.
46. Martin A, Jacobi F. Features of hypochondriasis and illness worry in the general population in Germany. Psychosomatic Medicine 2006;68:770-7.
47. Robbins JM, Kirmayer LJ. Transient and persistent hypochondriacal worry in primary care. Psychological Medicine 1996;26:575-89.

Tables

Table 1. Baseline demographic and clinical characteristics of persons who completed the Whiteley Index questionnaire in the Hordaland Health Study (N = 6819)

Characteristic	Hypochondriasis score < 95 percentile	Hypochondriasis score >= 95 percentile	Group differences
N (% of sample)	6542 (95.9)	277 (4.1)	
Gender, N (%)			Chi-sq=.244, df=1, p=.621
Female	3122 (47.7)	128 (46.2)	
Education, N (%)			Chi-sq=11.981, df=3, p<.01
Primary	1090 (16.7)	68 (24.5)	
Secondary	3041 (46.5)	117 (42.2)	
1–3 yr higher	1299 (19.9)	47 (17.0)	
4 yr higher	1112 (17.0)	45 (16.2)	
Income, N (%)			Chi-sq=67.891, df=6, p<.001
≥75 000	109 (1.7)	20 (7.6)	
≥125 000	165 (2.6)	13 (4.9)	
≥175 000	386 (6.1)	23 (8.7)	
≥250 000	1304 (20.6)	69 (26.1)	
≥350 000	1336 (21.1)	47 (17.8)	
≥450 000	1394 (22.0)	49 (18.6)	
≥500 000	1640 (25.9)	43 (16.3)	
Anxiety[1]	4.38 (4.31 – 4.46)	9.10 (8.62 – 9.58)	F=48.301, df=6817, p<.001
Depression[1]	3.09 (3.02 – 3.16)	6.73 (6.27 – 7.19)	F=91.851, df=6817, p<.001
Number of somatic diagnoses[1]	0.08 (0.07 – 0.09)	0.11 (0.07 – 0.15)	F=12.116, df=6804, p=.073
Number of self-reported somatic symptoms[1]	10.69 (10.50 – 10.87)	20.82 (19.71 – 21.92)	F=21.752, df=6817, p<.001

[1] values are expressed as means (95% confidence interval).

Table 2. Effect of health anxiety (continuous z-scaled score) on risk of disability pension award (N = 6819)

Adjustment variables	Full sample (N = 227 awards) [1]		Disability pensions awarded for anxiety disorders excluded (N = 212 awards) [1]		Disability pensions awarded for any mental disorder excluded (N = 177 awards) [1]	
	OR	95% CI	OR	95% CI	OR	95% CI
Crude	1.76	1.60 – 1.94	1.72	1.55 – 1.89	1.68	1.51 – 1.88
+ Gender	1.76	1.60 – 1.94	1.71	1.55 – 1.89	1.68	1.50 – 1.87
+ Income and education	1.66	1.50 – 1.83	1.62	1.46 – 1.79	1.59	1.42 – 1.78
+ Somatic Conditions[2]	1.64	1.48 – 1.81	1.60	1.44 – 1.78	1.58	1.41 – 1.77
+ HADS general anxiety[3]	1.60	1.42 – 1.81	1.59	1.40 – 1.81	1.68	1.47 – 1.93
+ HADS depression[3]	1.55	1.37 – 1.75	1.55	1.36 – 1.76	1.65	1.43 – 1.89
+ Somatic symptoms[3]	1.37	1.20 – 1.57	1.36	1.19 – 1.56	1.45	1.25 – 1.68

[1] N = 6592 not awarded disability pension during follow-up (1.0 to 6.6 years) as a common reference group
[2] somatic diagnosis and drugs taken for any somatic condition
[3] continuous variables

Table 3. Effect of health anxiety (case-level >= 95th percentile) on risk of disability pension award (N = 6819)

Adjustment variables	Full sample (N = 227 awards)[1]		Disability pensions awarded for anxiety disorders excluded (N = 212 awards)[1]		Disability pensions awarded for any mental disorder excluded (N = 177 awards)[1]	
	OR	95% CI	OR	95% CI	OR	95% CI
Crude	5.34	3.69 – 7.75	4.73	3.18 – 7.03	4.17	2.66 – 6.54
+ Gender	5.50	3.78 – 8.00	4.84	3.24 – 7.22	4.25	2.71 – 6.68
+ Income and education	4.69	3.19 – 6.88	4.15	2.76 – 6.25	3.72	2.35 – 5.90
+ Somatic Conditions[2]	4.55	3.09 – 6.70	4.04	2.68 – 6.10	3.65	2.30 – 5.79
+ HADS general anxiety[3]	3.42	2.22 – 5.26	3.16	2.00 – 4.99	3.38	2.03– 5.63
+ HADS depression[3]	3.05	1.97 – 4.72	2.86	1.80 – 4.53	3.13	1.88 – 5.24
+ Somatic symptoms[3]	2.29	1.46 – 3.58	2.12	1.32 – 3.40	2.33	1.38 – 3.94

[1] N = 6655 not awarded disability pension during follow-up (1.0 to 6.6 years) as a common reference group
[2] somatic diagnosis and drugs taken for any somatic condition
[3] continuous variables

Table 4. Effect of health anxiety, somatization, and comorbid health anxiety and somatization (based on a 90th percentile cut-off) on risk of disability pension award (N = 6819)

Adjustment variables	Health anxiety (N = 416) [1] OR (95% CI)	Somatization (N = 421) [1] OR (95% CI)	Comorbid health anxiety and somatization (N = 194) [1] OR (95% CI)
Crude effect model	3.81 (2.55 – 5.69)	4.53 (3.11 – 6.61)	9.36 (6.19 – 14.17)
+ Gender	3.87 (2.59 – 5.80)	3.99 (2.72 – 5.85)	8.91 (5.87 – 13.52)
+ Income and education	3.43 (2.28 – 5.17)	3.46 (2.35 – 5.09)	7.08 (4.63 – 10.84)
+ Somatic conditions[2]	3.33 (2.21 – 5.03)	3.20 (2.16 – 4.74)	6.62 (4.31 – 10.18)
+ HADS general anxiety[3]	3.13 (2.03 – 4.82)	3.03 (2.02 – 4.56)	5.94 (3.64 – 9.68)
+ HADS depression[3]	2.99 (1.94 – 4.63)	2.88 (1.92 – 4.34)	5.16 (3.15 – 8.46)

[1] neither somatization nor health anxiety (N = 5788) as a common reference group
[2] somatic diagnosis and drugs taken for any somatic condition
[3] continuous variables

Figure 1. The shape of the association between levels of health anxiety and disability pension award during 1.0 to 6.6 years follow-up (N = 6819)

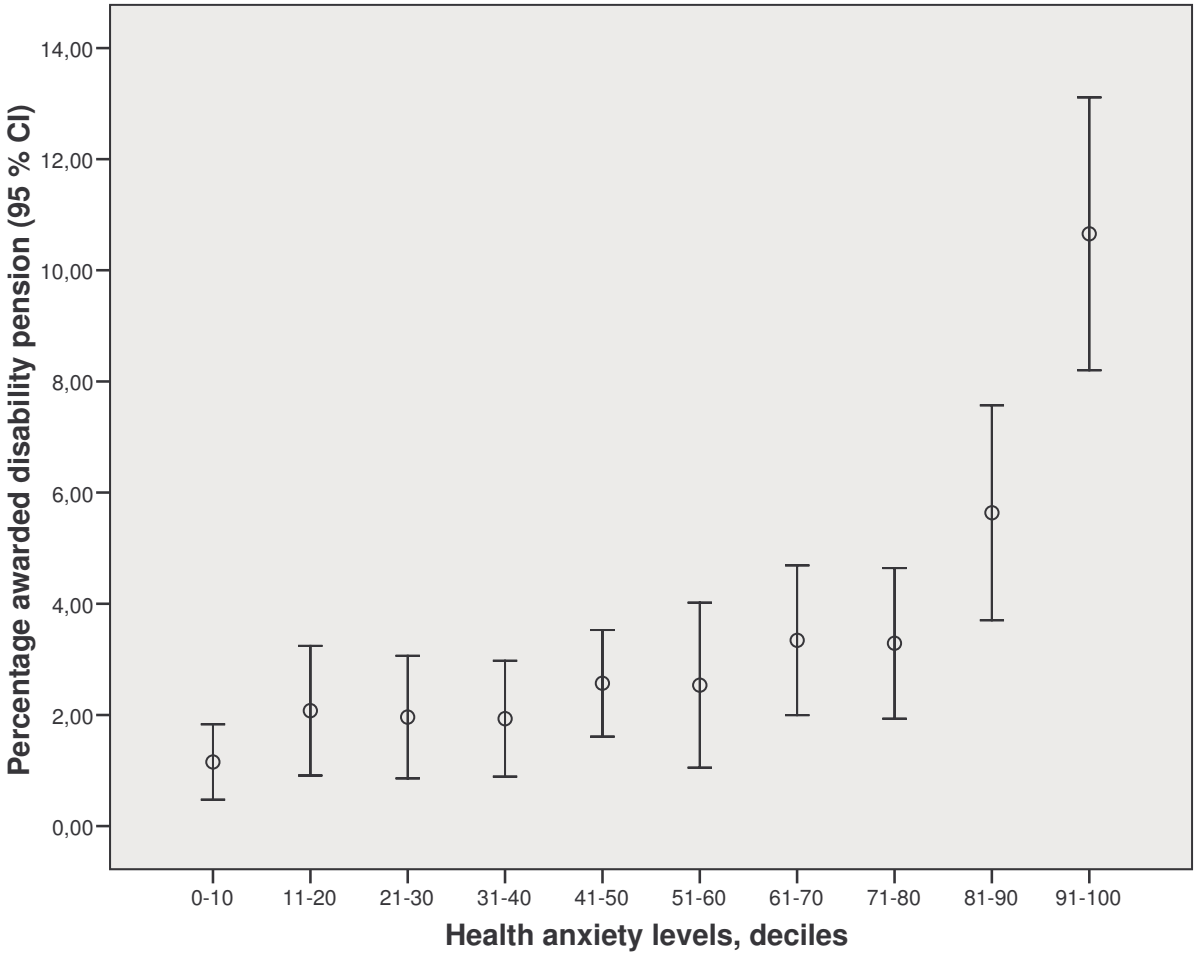

Table 5. Comparison of causes of disability pension award in persons with and without health anxiety (case-level >= 95th percentile) at baseline[1] (N = 215)

Official primary diagnosis for which disability pension was awarded	Health anxiety < 95 percentile (N = 178) N (%) 95% CI	Hypochondriasis score >= 95 percentile (N = 37) N (%) 95% CI
Psychiatric disorders (ICD F00 – F99)	36 (20.2) 14.3 – 26.1	14 (37.8) 22.2 – 53.5
Musculoskeletal disorders (ICD M00 – M99)	87 (48.9) 41.5 – 56.2	14 (37.8) 22.5 – 53.5
Other causes (any other ICD code)	55 (30.9) 24.1 – 37.7	9 (24.3) 10.5 – 38.1

[1] Chi-sq=5.326, df=2, p=.070

Table 6. Comparison of effects of health anxiety, HADS anxiety and HADS depression (all continuous variables z-scaled scores) on risk of disability pension award (N = 6819)

Adjustment variables	Predictor: Health anxiety (N = 227 awards) [1]		Predictor: HADS general anxiety (N = 227 awards) [1]		Predictor: HADS depression (N = 227 awards) [1]	
	OR	95% CI	OR	95% CI	OR	95% CI
Crude	1.76	1.60 – 1.94	1.55	1.38 – 1.74	1.58	1.42 – 1.76
+ Gender	1.76	1.60 – 1.94	1.50	1.34 – 1.69	1.63	1.46 – 1.81
+ Income and education	1.66	1.50 – 1.83	1.41	1.26 – 1.59	1.51	1.35 – 1.69
+ Somatic Conditions[2]	1.64	1.48 – 1.81	1.39	1.24 – 1.57	1.50	1.35 – 1.68
+ Somatic symptoms	1.37	1.21 – 1.54	1.06	0.92 – 1.22	1.25	1.11 – 1.42
+ HADS general anxiety[3]	1.41	1.24 – 1.61	-	-	1.32	1.14 – 1.53
+ Health anxiety[3]	-	-	0.91	0.78 – 1.07	1.26	1.08 – 1.46
+ HADS depression[3]	1.37	1.20 – 1.57	0.81	0.68 – 0.96	-	-

[1] N = 6592 not awarded disability pension during follow-up (1.0 to 6.6 years) as a common reference group
[2] somatic diagnosis and drugs taken for any somatic condition
[3] continuous variables

Table 7. Principal component analysis of the Whiteley Index and the effect of each factor (continuous z-scaled score) on risk of disability pension award (N = 6819)

Whiteley Index item	Bodily preoccupation[1]	Disease phobia[1]	Disease conviction[1]
2 Are you bothered by many aches and pains?	0.73	-	0.21
4 Do you worry a lot about your health?	0.72	0.36	0.11
5 Do you often have the symptoms of very serious illnesses?	0.68	0.28	0.19
8 Do you find that you are bothered by many different symptoms?	0.64	0.33	-
13 Do you think there is something seriously wrong with your body?	0.53	0.49	0.13
1 Do you often worry about the possibility that you have got a serious illness?	0.13	0.78	0.11
3 Do you find that you are often aware of various things happening in your body?	-	0.75	0.17
6 If a disease is brought to your attention (through the radio, television, newspapers or someone you know) do you worry about getting it yourself?	0.41	0.70	-
12 Do you think that you worry about your health more than most people?	0.36	0.60	0.25
14 Are you afraid of illness?	0.36	0.43	0.15
7 If you feel ill and someone tells you that you are looking better, do you become annoyed?	-	0.11	0.82
9 Is it easy for you to forget about yourself and think about all sorts of other things?	0.50	-	0.58
10 Is it hard for you to believe the doctor when he tells you there is nothing for you to worry about?	0.19	0.27	0.49
11 Do you get the feeling that people are not taking your illness seriously enough?	0.42	0.22	0.47
Eigenvalue	3.10	2.91	1.71
Explained Variance	22%	21%	12%
Effect on disability pension award (N = 277 awards)[2]	OR (95% CI)	OR (95% CI)	OR (95% CI)
Crude	2.03 (1.83 – 2.26)	0.87 (0.74 – 1.02)	1.45 (1.30 – 1.62)
+ Gender	2.06 (1.85 – 2.29)	0.87 (0.74 – 1.01)	1.44 (1.29 – 1.60)

[1] Values below .10 are not reported
[2] N = 6655 not awarded disability pension during follow-up (1.0 to 6.6 years) as reference group